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RCRA/SUPERFUND HOTLINE MONTHLY SUMMARY

FEBRAURY 89

1. Coke and Coal Tar Recyclable Material Requirements

A facility owner/operator "blends" decanter tank tar sludge from coking operations (K087) with purchased creosote (a diluent) to use a fuel in an open hearth furnace to produce steel. Since creosote is derived from coal tar, would this K087/creosote fuel meet the exclusion in 40 CFR Section 261.6(a)(3)(vii) for coke and coal tar from the iron and steel industry that contains K087?

No. The exclusion in Section 261.6(a)(3)(vii) applies only to the coke and coal tar fuels that are derived from K087 waste. Coke is the residue from the destructive distillation of coal. The coke serves as both a fuel and a reducing agent in iron and steel production processes. Some coke plants recover by-products give off or created during the coke production process. The recovery of the by-products generates the tar decanter sludge, K087.

During the recovery of the volatile organics in the by-product coke production process, tar separates by condensation from coke oven gas and drains into a decanter tank. The tar sludge settles to the bottom

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RCRA/SUPERFUND HOTLINE MONTHLY SUMMARY

FEBRUARY 89

1. Coke and Coal Tar Recyclable Material Requirements (Cont'd)

of the tank and is regulated as K087 (see Figure 1). K087 is considered hazardous because of the high levels of phenol and naphthalene which are toxic to humans and aquatic life (see Listing Background Document for K087).

Some coke plants use the decanter tank tar sludge (K087) as a raw material in either the sintering process or open hearth furnace operations. The sludge can be recycled by mixing it with coal before it is charged to a coke oven to produce coke (Figure 1). The coke product is then used as a fuel in steel blast furnaces. Additionally, the sludge is sometimes mixed back into the coal tar by-product which is also frequently used as a fuel.

In the January 11, 1985 Federal Register (50 FR 1684), the EPA proposed toexempt coke and coal tar fuel derived from K087 if sufficient data was provided to EPA to demonstrate that contaminants in the recycled waste did not add significant concentrations of contaminants to the coke fuel product (50 FR 1689-1690). The exemption was proposed to be applied narrowly and only to fuel products containing hazardous waste that was generated by the production process itself. The exemption would only apply to the coke and coal tar hazardous waste fuel. It would not apply to fuels containing other wastes and would not apply to wastes before they are reintroduced into the production process. Thus, generators would have to comply with the storage requirements of 40 CFR 262.34 or the facility standards per 40 CFR 264/265 (50 FR 1689-1690).

In the November 29, 1985 Federal Register, the EPA finalized the exemption for K087 waste derived coke (a hazardous waste fuel) and the exemption of coal tar produced from coal tar decanter sludge (see Figure 1). Coke and coal tar fuels derived from K087 are excluded from regulation when used to produce coke because the contaminants levels in the coke do not appreciablyincrease by recycling the tar sludge (K087). Both of these wastes derived fuels are exempt per 40 CFR 261(a)(3)(vii)(see 50 FR 49170-49171).

Therefore, in this situation, where the decanter tank tar sludge (K087) is mixed or blended with purchased creosote, the exemption would not apply because coal tar is not being recycled and no coke fuel is derived (see Figure 2). The owner or operator of the process in question in mixing hazardous waste (K087) with creosote. The burning of this hazardous waste would be subject to the incinerator regulations under 40 CFR Part 264/265 Subpart O.

Source: Dwight Hlustick (202) 382-7926
Research: Renee Pannebaker (202) 382-3000

BACKGROUND DOCUMENT

RESOURCE CONSERVATION AND RECOVERY ACT

SUBTITLE C - IDENTIFICATION AND LISTING OF HAZARDOUS WASTE

§§261.31 and 261.32 - Listing of Hazardous Wastes (Finalization of July 16, 1980 Hazardous Waste List)

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF SOLID WASTE

January 12, 1981

LISTING BACKGROUND DOCUMENT

K087: Decanter Tank Tar sludge from coking operations* (T)

I. Summary of Basis for Listing

The spray cooling of coke oven gases during the by-product recovery process results in the generation of a decanter tank tar-sludge. The Administrator has determined that decanter tank tar-sludge may pose a present or potential hazard to human health or the environment when improperly transported, treated, stored, disposed of or otherwise managed, and therefore should be subject to appropriate management requirements under Subtitle C of RCRA. This conclusion is based on the following considerations:

1) The tank tar-sludge contains significant concentrations of phenol and naphthalene. Phenol and naphthalene are toxic to humans and aquatic life.

2) Phenol has leached in significant concentration from a waste sample tested in a distilled water extraction procedure. Although no leachate data is currently available for naphthalene, the Agency believes that, due to its presence in the tar in high concentrations and due to its relative solubility, naphthalene also may leach from the waste in harmful concentrations if the waste is improperly managed.

3) These tar-sludges are often land disposed in on-site landfills or dumped in the open. These methods may be inadequate to impede leachate migration and resulting groundwater contamination.

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*The listing description has been amended from that originally proposed on December 18, 1979 (43 FR 58959) which included two waste listings [i.e., Coking: Decanter tank tar and Coking: Decanter tank pitch/sludge]

Additional information substantiating the hazards associated with polynuclear aromatic hydrocarbon constituents in this waste will be evaluated in an expanded listing background document for an integrated by-product coke-making process.

II. Waste Generation, Composition and Management

Coke, the residue from the destructive distillation of coal, serves as both a fuel and as a reducing agent in the making of iron and steel. Some coke plants recover by-products given off or created during the coke production process, and the recovery of by-products generates a sludge which is the listed waste in this document. There are 66 by-product coke plants, which generate an estimated 72,300 tons/yr of decanter tank tar-sludge. During the recovery of chemicals in the by-product coke production process, tar separates by condensation from coke oven gas and drains to a decanter tank. Recoverable oil fractions are decanted off the top and the tar sludge settles to the bottom.

Approximately 97% of this tar-sludge is elemental carbon. The remaining 3% consists of condensed tar materials. These condensed tar materials contain the waste constituents of concern, namely phenolic compounds and naphthalene, which are formed as a result of the destructive distillation of coal.

Based on a published reference, the condensed tar component contains, by weight, 2.2% naphthalene and 0.1% phenolic compounds(2). With an estimated 2,169 tons/yr of condensed tar contained in the amount of tar-sludge generated annually (i.e., 3% of the 72,300 tons/yr of tar-sludge), approximately 47.7 tons of naphthalene and 2.2 tons of phenolic compounds will be contained in the waste generated each year(1,2).

Of the 66 coke plants generating decanter tank tar-sludge, 30 plants use the tar-sludge as a raw material in either the sintering process or open hearth furnace operation. The remaining 36 plants dispose of this waste in unsecure on-site landfills[1], or by dumping in the open[3].

III. Hazardous Properties of the Waste

Phenol and naphthalene are present in the tar component of this waste in significant concentrations: 0.1% by weight (1000 ppm) and 2.2% by weight (22,000 ppm), respectively[2]. Phenol and naphthalene are toxic to humans and aquatic life. Thus, the Agency believes that the concentrations of these materials in the waste are quite significant, in light of the constituents' known health hazards. Further, these waste constituents appear capable of migrating in significant concentrations if mismanaged, and are likely to be mobile and persistent so that waste mismanagement could result in a substantial human health or environmental hazard.

Phenol's potential for migration from this waste in significant concentrations has been demonstrated empirically. Phenol leached in significant concentration (approximately 500 ppm) from a decanter tar-sludge waste sample subjected to distilled water extraction procedure.[3] In addition, phenol is extremely soluble, about 67,000 ppm @ 25°C[5], indicating high potential for migration. Phenol biodegrades at a moderate rate in surface water and soil but moves very

readily (App. B). Even with a persistence of only a few day, the rapid spreading of phenol could cause widespread contamination of the eco-system and contamination of potable water supplies.

The migratory potential of phenol and its ability to move through soils is further confirmed by the fact that it has been detected migrating from Hooker Corporation's S Area, Hyde Park, and 102nd St. landfills in Niagara, New York (OSW Hazardous Waste Division, Hazardous Waste Incidents, Open File, 1978). The compound's persistence following migration is likewise shown by these incidents.

Although no comparable leachate data is currently available for naphthalene, the Agency believes that this constituent also may leach in harmful concentrations from the waste if not properly managed. The water solubility of naphthalene has been reported to range from 30 to 40 mg/l, depending on the salinity of the dissolving medium (7). Naphthalene has been identified in finished drinking water, lakes, and rivers, demonstrating its persistence and mobility (4). This information, naphthalene's solubility in water, and its presence in the tar in such high concentrations (22,000 ppm) make it likely that it will leach from the waste in potentially harmful concentrations if the waste is mismanaged, and will then be mobile and persistent, and so poses the potential for causing substantial hazard to human health and the environment.

Current practices of disposing of this waste in fact appear inadequate. Disposal of decanter tank tar-sludge in unsecured landfills or by dumping in the open makes it likely

Systemic reaction to acute exposure to naphthalene includes nausea, headache, diaphoresis, hematuria, fever, anemia, liver damage, convulsions and coma. Industrial exposure to naphthalene appears to cause increased incidence of cataracts. Also, hemolytic anemia with associated jaundice and occasionally renal disease from precipitated hemoglobin has been described in newborn infants, children, and adults after exposure to naphthalene by ingestion, inhalation, or possibly by skin contact.

The Office of Water Regulations and Standards, U.S. EPA[7] has found that acute and chronic toxicity to freshwater aquatic life occur at concentrations as low as 2,300 and 620 ug/l, respectively, and would occur at lower concentrations among species that are more sensitive than those tested. The available data for naphthalene indicate that acute toxicity to saltwater aquatic life occurs at concentrations as low as 2,350 ug/l and would occur at lower concentrations among species that are more sensitive than those tested. Using the present guidelines, a satisfactory criterion for ambient water quality could not be derived at this time because of the insufficiency of data for naphthalene.

OSHA's standard for exposure to vapor for a time-weighted industrial exposure is 50 mg/m^3.

Sax lists naphthalene as moderately toxic via the oral route and warns that naphthalene is a demonstrated neoplastic

substance via the subcutaneous route in experiments done on laboratory animals[4]. Additional information and specific references on the adverse effects of naphthalene can be found in Appendix A.

REFERENCES

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4. Sax, N.I. Dangerous properties of industrial materials, Van Nostrand Reinhold Co., New York. 5th ed., 1979.

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